

**QUARTERLY REPORT
FOR THE
MOUND SITE PLUME TREATMENT PROJECT
OCTOBER 1998 THROUGH DECEMBER 1998**

December 29, 1998

INTRODUCTION

The Mound Site Plume Treatment System collects and treats the contaminated groundwater plume derived from the Mound Site to the groundwater Action Level Framework Tier II level concentrations defined in the Rocky Flats Cleanup Agreement (RFCA) (DOE, 1996), and demonstrates the feasibility of using this system on other contaminated groundwater plumes.

Installation of a 230-foot long below-grade impermeable barrier membrane/collection system along with two treatment cells was completed on September 18, 1998. Startup and repair activities were completed and the EPA SITE program began effluent sampling on October 28, 1998. This was performed after the EPA SITE Program and Rocky Flats Environmental Technology Site (RFETS) personnel agreed that the tap water emplaced in the reactor vessels during construction had been displaced by contaminated groundwater from the Mound Site plume. This report covers the activity and available data for the quarter from October 1 to December 31, 1998. Completion of the installation and repairs to the treatment system during this quarter limits the detail that can be provided.

The Mound Site Plume Treatment Project was a cooperative effort between RFETS and the Department of Energy Subsurface Contaminant Focus Area (EM-50), with support from the US Environmental Protection Agency (EPA) SITE Program. The Mound Site Plume Treatment Project employs innovative technology for the collection and treatment of contaminated groundwater containing chlorinated organic contamination and low levels of radionuclides. Table 1 shows the constituents greater than Tier II levels from water collected in 1995 at the SW059 seep below the Mound Site, which represents the majority of the water collected by this system.

The project has had no safety issues. The repairs identified during the startup and shakedown period have been completed. The lessons learned from the installation and startup of the Mound Site Plume Treatment Project were incorporated into both the East Trenches project and the Solar Pond Plume project.

PROJECT EVENTS

The two treatment cells each contain 8 feet of iron filings that act as the treatment medium for the contaminated water. With proper maintenance, the life expectancy of iron filings is from 5 to 10 years. The surface of the iron filings require regular raking with an asphalt rake to prevent formation of a crust. A delay in the startup of the maintenance during the startup and shakedown period allowed a crust to form on the surface of the iron filings layer in the first treatment cell. The crust formed from contact with the contaminated groundwater for the period from mid-July through August. The crust was mottled tan and rust-colored, and was up to 2 inches thick and was broken-up with a

concrete vibrator. Pieces of the crust were collected on December 16 for isotopic analysis, with results expected on January 18, 1999. The crust will be removed from the treatment cell and appropriately disposed based on the results of the samples.

Leaks in the treatment system were detected and repaired during the startup and shakedown period with no release of contaminated groundwater. However, a December 1st investigation into additional piping problems at the treatment system revealed a small leak from the inlet pipe into the first treatment cell. Contaminated groundwater dripped back underground in the plume area when water levels in the treatment vessel rose over approximately one foot over the level of the inlet pipe during leak testing. The amount of water released into the ground could not be quantified, but was likely small because of the location of the leak, and because the inlet pipe is under low pressure as the system is gravity fed. No spill of untreated water into South Walnut Creek took place. The occurrence was reported with tracking number 98-0730. A fact finding and path forward meeting were held and the appropriate repairs were performed for this and the other identified leak. Pressure and static head tests were then conducted to verify that the system was functioning as designed. Final repairs were completed on December 11, 1998. Backfill and compacting were finished on December 14. Installation of valve labels and the construction of a gravel path to the treatment cells also took place during this time period.

Intermittent flow rate tracking took place from July through November due to insufficient battery power to continuously operate the tracking system. The problem was corrected by replacing instrumentation, improving the alignment of the solar panel that charges the battery and reducing the data collection interval from once every 30 seconds to once every minute to reduce drain on the battery. Data collection has been continuous following these changes which were completed on November 18, 1998.

The system was designed so that no freeze protection will be necessary. During the December 1998 cold snap, no ice was observed within the system indicating that the burial depth does provide sufficient insulation to prevent freezing.

TREATMENT EFFECTIVENESS

Available flow rates from the treatment system for the October-November period are shown on Figure 1. The lines shown connect the average flow rates over approximately a 24-hour period intermittently during the two months. The flow rate can range from zero to slightly over 8 gallons per minute with averages changing due to precipitation and testing or repairs. High initial flow rates were attributed to groundwater storage within the collection trench. Flow rates then decreased over time. Water levels within the collection trench are shown in Table 2 and were determined by 5 piezometers (P1 through P5).

Weekly sampling of the effluent from the treatment system commenced the week of October 28, 1998 although grab samples previously collected by the EPA confirmed that the system was meeting treatment objectives. Results of the effluent analysis for chlorinated organic contaminants are shown in Table 3. The data in Table 3 can be compared to the chlorinated organic contaminants analytical results from SW059 shown in Table 1 as a means of determining the effectiveness of the treatment system. Water previously collected at SW059 is expected to make up the majority of the water collected by this system. Before the treatment system was installed (Table 1), carbon tetrachloride, chloroform, methylene chloride, tetrachloroethene, trichloroethene, and vinyl chloride were all in excess of the Tier II levels at SW059. The results following the treatment (Table 3-shown in the column titled Effluent 11/04/98) are all non-detects (ND) except for acetone, methylene chloride, and 2-Butanone (MEK). Removal efficiencies of the contaminants were not calculated because these were not detected in the effluent samples.

Though detected in the effluent, acetone has not been encountered anywhere else in the system and cannot be a treatment reaction product. The same is true of 2-Butanone (MEK). It is assumed that the detection of both of these is a product of contamination within the testing lab. Methylene chloride is found in the influent, but at a lower amount than within the effluent. Again, this could be a product of lab contamination, but also might be due to a reaction within the treatment system. Regardless of the origin, the concentration is below action levels. Further sampling and analysis will clarify if and how each of these three contaminants is being detected within the effluent. That none of the other organic contaminants were present is the confirmation of the effectiveness of the treatment system.

CONCLUSIONS

The Mound Site Plume Treatment Project is fully operational and treating contaminated groundwater to below the specified system performance requirements. Ongoing maintenance, raking the iron filings and retrieving flow rate and water level data, are the only required activities. Sampling will continue at regular intervals to verify the performance of the treatment. For the next quarter, January through March 1999, no changes in the system are expected.

REFERENCES

- DOE, 1996, *Final Rocky Flats Cleanup Agreement*, Rocky Flats Environmental Technology Site, Golden, CO, July.
- DOE, 1997, *Final Mound Site Plume Decision Document*, RF/RMRS-97-024, September.

Table 1. Seep SW059 Contaminants of Concern Greater than Tier II Groundwater or Surface Water Action Levels in 1995 (from the Mound Site Plume Decision Document - DOE, 1997)

Chemical Name	Min. Value	Max. Value	Avg. Detect	No. Detects	GW Tier I Action Levels	GW Tier II Action Levels	SW Action Levels	GW Back-ground	SW Back-ground	Action Level Exceeded
Total Americium-241 (pCi/l)	0	0.25	0.08	7	15	0.15	0.15**	0.03	0.02	GW Tier II and SW
Total Uranium isotopes (pCi/l)	17.6	17.6	17.6	1	NA	NA	10	NA	1.63	SW
Total Uranium-233,-234 (pCi/l)	2.81	5.4	3.69	6	298	3	NA	85.3	1.59	U233+D only above GW Tier II
Total Uranium-238 (pCi/l)	2.25	5.03	3.16	6	77	1	NA	60.3	1.23	GW Tier II
Carbon Tetra-chloride (ug/l)	3	120	29.29	14	500	5	5	NA	NA	GW Tier II and SW
Chloroform (ug/l)	5	25	8.5	14	10,000	100	6	NA	NA	SW
Methylene Chloride (ug/l)	0.1	0.3	0.14	6	500	5	5	NA	NA	GW Tier II and SW
Tetrachloro-ethene (ug/l)	1	21	9.29	14	500	5	5	NA	NA	GW Tier II and SW
Trichloroethene (ug/l)	5	71	12.79	14	500	5	5	NA	NA	GW Tier II and SW
Vinyl Chloride (ug/l)	0.7	3	0.55	4	200	2	2	NA	NA	Max value above GW Tier II and SW

Note: Background values are equal to the background mean plus two standard deviations

** A surface water action level of 0.05 pCi/l for Americium 241 will be met until January 1998.

Figure 1. Effluent Flow Rates

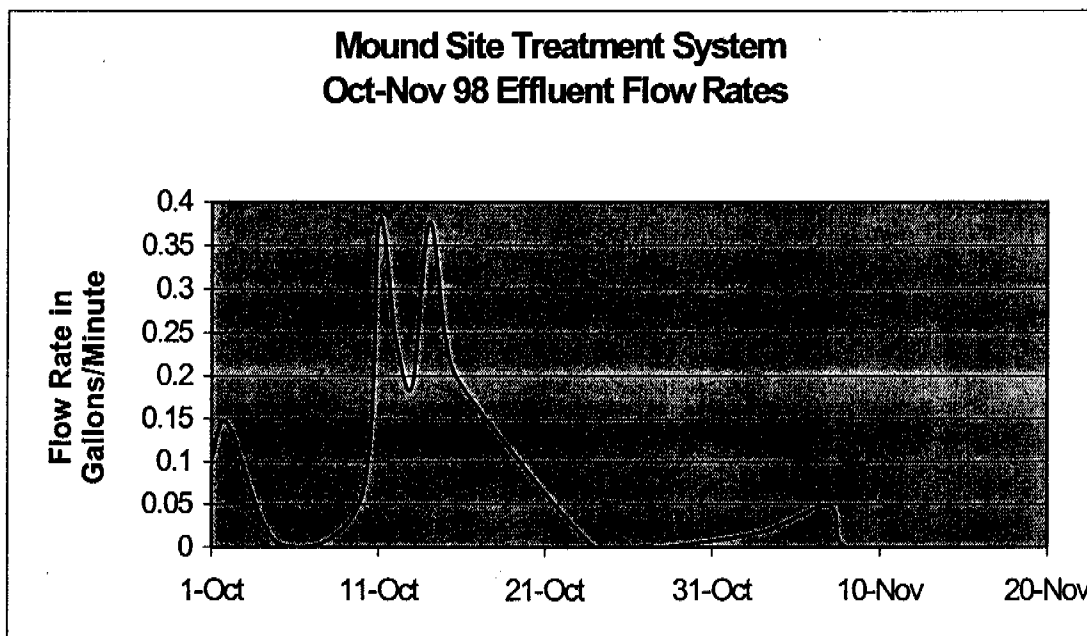


Table 2. Piezometer Water Levels (showing levels measured in the collection trench)

<u>Date</u>	<u>Piezometer</u>	<u>Water Level</u> (in feet below top of casing)
8/05/98	P1	dry
	P2	11.43
	P3	8.84
	P4	8.91
	P5	11.91
10/09/98	P1	dry
	P2	10.55
	P3	7.8
	P4	7.93
	P5	not measured
10/22/98	P1	dry
	P2	11.1
	P3	8.47
	P4	8.53
	P5	11.51
10/28/98	P1	dry (TD - 10.9 feet)
	P2	10.6
	P3	8.0
	P4	8.0
	P5	not measured

